

CLAIMS

1. A liquid crystal device comprising a first cell wall and a second cell wall enclosing a layer of liquid crystal material;  
5 electrodes for applying an electric field across at least some of the liquid crystal material;  
a surface alignment structure on the inner surface of at least the first cell wall providing a desired  
10 alignment to the liquid crystal molecules, wherein the said surface alignment structure comprises a random or pseudorandom two dimensional array of features which are shaped and/or orientated to produce the desired alignment.  
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2. A device as claimed in claim 1, wherein the geometry and spacing of the features is such as to cause the liquid crystal material to adopt a locally planar or tilted planar alignment.  
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3. A device as claimed in claim 2, wherein the inner surface of the second cell wall is treated to produce a locally homeotropic alignment of the liquid crystal material, whereby the cell functions in a hybrid  
25 aligned nematic mode.
4. A device as claimed in claim 2, wherein the inner surface of the second cell wall is treated to produce a locally planar or tilted planar alignment of the liquid  
30 crystal material substantially at right angles to the alignment direction on the first cell wall, whereby the cell functions in a TN or STN mode.
5. A device as claimed in claim 1, wherein the  
35 geometry and spacing of the features is such as to

cause the liquid crystal material to adopt a locally homeotropic alignment.

6. A device as claimed in claim 1, wherein the  
5 features are shaped and/or orientated so as to produce a substantially uniform planar or tilted planar alignment of the liquid crystal director in a single azimuthal direction.

10 7. A device as claimed in claim 1, wherein the features are shaped and/or orientated so as to produce a substantially uniform planar or tilted planar alignment of the liquid crystal director in a plurality of azimuthal directions.

15 8. A device as claimed in claim 1, wherein the features comprise posts which are tilted with respect to the normal to the plane of the first cell wall.

20 9. A device as claimed in claim 1, further including an analyser and a polariser mounted on the cell walls.

10. A device as claimed in claim 1, wherein the features are of different height, different shape,  
25 different tilt and/or different orientation in different regions of the device.

30 11. A device as claimed in claim 1, wherein tilt angle and orientation of the posts are uniform throughout the device.

12. A cell wall for use in manufacturing a liquid crystal device according to claim 1, comprising a wall and an alignment surface microstructure on one surface  
35 thereof for aligning the director of a liquid crystal

material, the said microstructure comprising a random or pseudorandom two dimensional array of features which are shaped and/or orientated to produce the desired alignment.

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13. A method of manufacturing a cell wall in accordance with claim 12, comprising applying a photoresist material to a surface of a wall, exposing the applied photoresist material to a suitable light source through  
10 a mask which has a random or pseudorandom two dimensional array pattern, removing unexposed photoresist, and hardening the exposed photoresist material to produce a random or pseudorandom two dimensional array of alignment features on the wall.

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14. A method of manufacturing a cell wall in accordance with claim 12, comprising applying a plastics material to the surface of a wall, and embossing a random or pseudorandom two dimensional array of alignment features  
20 into the plastics material.

15. A method of manufacturing a liquid crystal device in accordance with claim 1, comprising securing a first cell wall in accordance with claim 11 to a second cell  
25 wall, at least one of the cell walls having an electrode structure thereon, so as to produce a cell having spaced apart cell walls the inner surfaces of which each carry at least one electrode structure; filling the cell with a liquid crystal material, and sealing the cell.

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